AFMS

THE NORTHERN VIRGINIA MINERAL CLUB INC

The Mineral Newsletter

Meeting: May 18 Time: 7:45–9:00 p.m.

Long Branch Nature Center, 625 S. Carlin Springs Rd. Arlington, VA 22204

The Gachala Emerald (858 carats), one of the largest gem-quality emeralds in the world, was found in 1967 at the La Vega de San Juan Mine in Gachalá, Colombia. You can see it at the Smithsonian National Museum of Natural History. Source: Wikipedia.

Emerald

May

birthstone

Volume 56, No. 5
May 2015
You can explore our club website:
http://www.novamineralclub.org/

Northern Virginia Mineral Club members,

Please join our board members for dinner at the Olive Garden on May 18 at 6 p.m.

Olive Garden, Baileys Cross Roads (across from Skyline Towers), 3548 South Jefferson St. (intersecting Leesburg Pike), Falls Church, VA
Phone: 703-671-7507

Reservations are under Kathy Hrechka, Vice-President, NVMC. Please RSVP to Kathy at 703-407-5393 or kshrechka@msn.com.

Club Member "Show and Tell"
May 18 Program

by Kathy Hrechka, Vice-President

Here's your opportunity to share with other club members! Maybe you have a mineral you want to show—or maybe you just need help identifying a rock. Or maybe you have a collecting adventure you'd like to share.

This meeting is designed for fellowship with like-minded rockhounds. Kathy Hrechka will display micromounting … and you can feature any aspect of our hobby you like!

Refreshments and light snacks will be provided. Remember to wear your name tag, if you have one.

The Prez Sez

by Wayne Sukow

I suspect that most of you who read this are very busy planning summer rock-and-mineral outings. I'm with you!

However most of my planning is oriented toward family events. That includes a recently completed group birdwatching outing on Maryland's Eastern Shore. All the birders were as excited at seeing a prothonotary warbler in a cypress swamp as I would have been at finding a flawless 2-pound canary-yellow datolite nodule.

However, even as a casual birder I was impressed by the colors and their blending together. It's fun to do things of common interest in groups.

Not surprisingly, I heard that a fair number of local birder groups had problems with slowly decreasing membership. They also had difficulties finding leaders for the group; where have you heard that before?

Identifying birds by ear meant listening—listening with no conversation. And if you were not a "dyed-in-the-wool" birder, you might have done some thinking about another hobby, such as mineral collecting—and identifying the similarities in the way our groups function.

I did!

In the past month, I have also spent the better part of 5 days going to proofreadings and revisions of a manuscript that centers on the colorful datolite nodules in Michigan's Copper Country. Coordinating 100-plus photos and their captions, along with the references in the narrative, is painstaking but enjoyable work.

At the same time, I'm busy creating two 2016 calendars. The first is titled "Lake Superior Agates From the Keweenaw Peninsula … Plus One;" the second has the title "Datolite Nodules From Keweenaw Peninsula Copper Mines."

Can you guessed what your Prez is bringing to any NVMC "Show and Tell" program in 2015?

I'll also bring some other items of interest to our club members: recognition certificates from the Eastern Federation's 2015 B.E.A.C. competition; and … hear ye, hear ye, hear ye … an NVMC 2015 budget.

Come join us for the fun! Think of it as the first of your summer fun activities! ⛏

In this issue …

Deadline for Submissions

June 1

We need to send out our newsletter on time, so please make your submission by the 1st of the month! Late submissions might go into a later newsletter.

Female prothonotary warbler. The wood warblers are all highly prized sightings by birdwatchers, this one in particular—its numbers are declining. Source: Wikipedia.

Previous Meeting Minutes
April 27, 2015

by Dave MacLean, Secretary

Vice-Pesident Kathy Hrechka called the meeting to order at 7:45 p.m. at the Long Branch Nature Center in Arlington, VA.

The minutes of the March 23, 2015, meeting were approved as published in *The Mineral Newsletter*.

Kathy recognized past Presidents Sue Marcus and Rick Reiber.

Kathy also recognized guest Vicky Wise, wife of the speaker at the meeting, Mike Wise.

New Business

By motion duly made and seconded, the members approved awards of $250 from Fred C. Schaefermeyer Scholarship Fund to two students. Awards went to Tyler Hanson, a student at James Madison University (JMU) in Harrisonburg, VA, who is planning on examining Niagara Falls and attending the Rochester Mineral Symposium; and to Joshua Benton, a student on the Annandale Campus of Northern Virginia Community College (NVCC). Dr. Lance Kearns at JMU and Dr. Shelby Jaye at NVCC nominated the two students. Each student will write an article for our club newsletter.

Consideration of the 2015 club budget was postponed until the space rental cost for the November 2015 NVMC show at George Mason University is known.

Pat Flavin, Bill Oakley, and Robert Groves won mineral specimens in the award drawing.

Announcements

Hutch Brown, editor of our club newsletter, asked for contributed articles. In particular, he invited members to contribute to a monthly feature called "Mineral of the Month."

"Boy Scouts' Digest" had an article on the November 2014 NVMC show.

The AFMS newsletter reported that Jim Kostka was nominated as Rockhound of the Year.

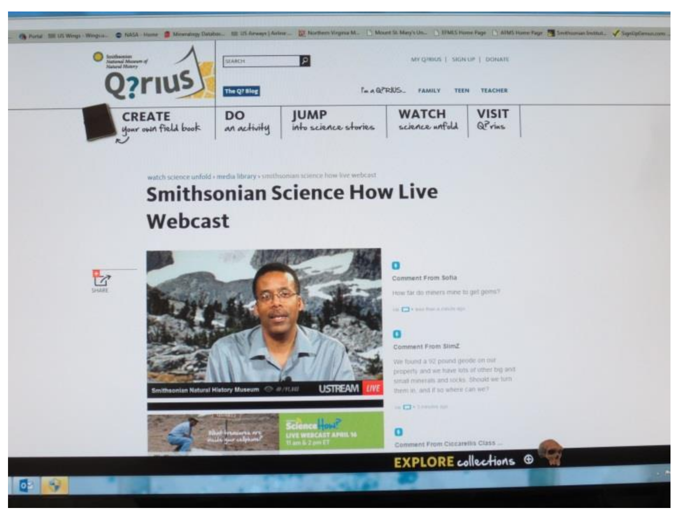
The Boy Scouts of America established merit badge 6500, "Mining and Society." The Scouts need volunteer counselors for this merit badge. To volunteer, go to the mineralcoalition.org Website.

Mike Wise, who presented the program for the club's April meeting, together with his wife Vicky.

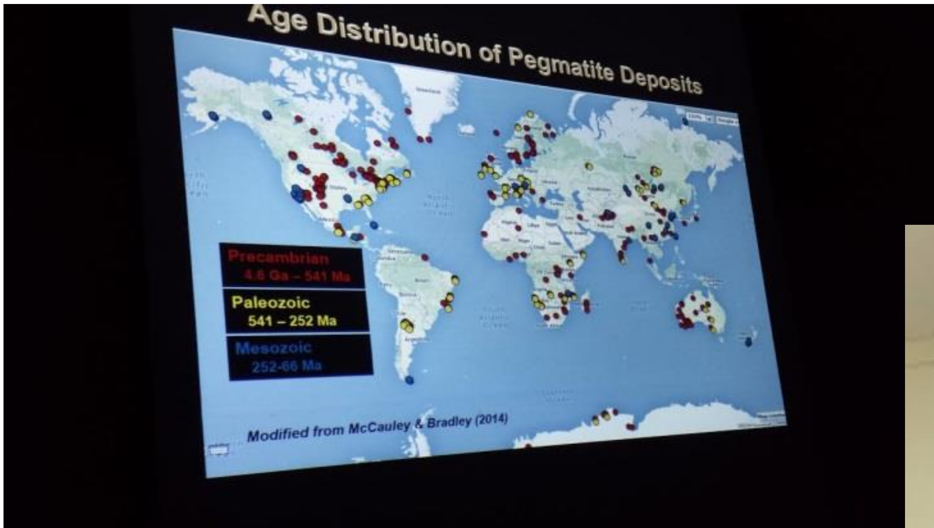
By motion duly made and seconded, the members adjourned the business portion of the meeting.

Program and Speaker

The program followed. The speaker was Dr. Michael Wise from the Department of Mineral Sciences at the Smithsonian Institution. The title of his outstanding presentation was "Patterns of Distribution of Granitic Pegmatites: A Global Perspective."

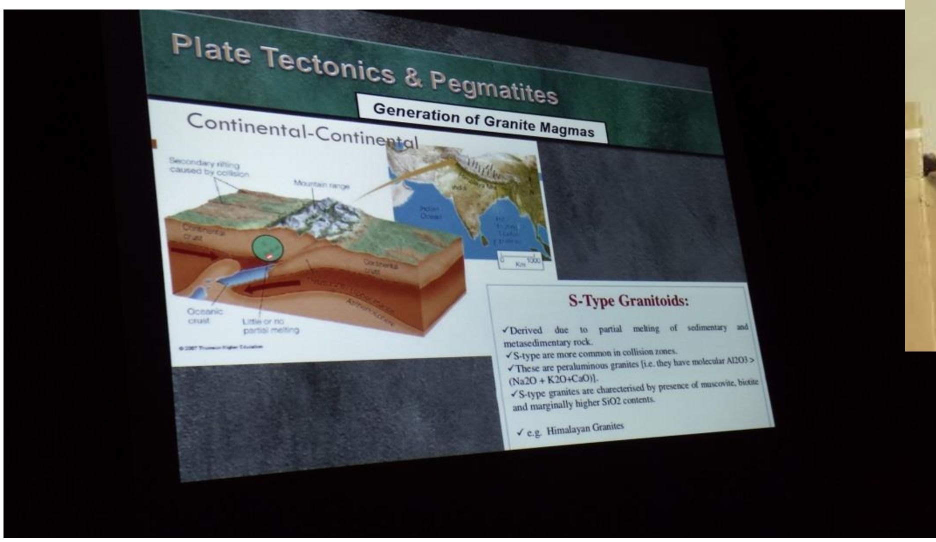


Hear Mike Wise talk about pegmatites on a Webcast in Q?rius, the online education zone for teenagers. http://qrius.si.edu/webcast-mineral-dependence-gemstones-cellphones



April Program: Global Distribution of Pegmatites

with Dr. Michael Wise



At the April NVMC meeting, club members (below) listened to Mike Wise (above) make a point about the connection between major tectonic events such as mountain building and the global distribution of pegmatite deposits. Photos: Sue Marcus and Hutch Brown.

Mineral of the Month: Vivianite

by Hutch Brown and Sue Marcus

Vivianite ($Fe^{++3}(PO_4)_2 \cdot 8(H_2O)$) is a hydrated iron phosphate first described in 1817 by the German geologist Abraham Gottlob Werner (1749–1817). He named it for the Welsh mineralogist John Henry Vivian (1785-1855), who discovered it at Wheal Kind in Cornwall.

Vivianite occurs as a secondary mineral in metallic ore deposits as well as in pegmatites. It also forms in sedimentary rock in association with organic material, so it can be found with fossilized shells and bones.

Vivianite belongs to the monoclinic crystal system, with prismatic crystals that easily split. Pure vivianite is colorless, but it easily oxidizes, becoming deep blue or bluish green.

Vivianite is soft, with a Mohs hardness of 2 or less. It has a vitreous luster and a white streak.

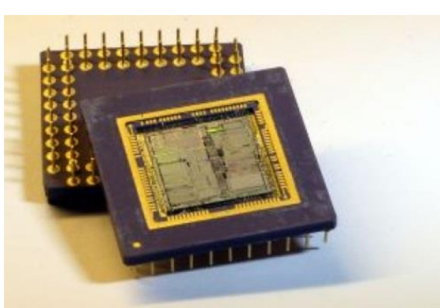
Virginia is home to a well-known vivianite locality in Richmond. World-famous vivianite crystal clusters were found during construction of a road and tunnel east of the Virginia state capitol district, about a hundred yards west of what is now I–95, near North 14th Street.

One source recommends keeping vivianite specimens in the dark, since many might crack and darken under prolonged exposure to light. Virginia vivianite is subject to crumbling and needs careful treatment. Bolivian vivianite, like the specimen shown here, is more durable but also more expensive.

Vivianite is pleochroic—blue when viewed along one crystal axis and green along another.

Sources: Wikipedia, Mineralogy Database, and Minerals.net.

Vivianite with pyrite, part of the Smithsonian National Mineral Collection, from Oruro, Bolivia. Photo: Chip Clark. [*http://geogallery.si.edu/index.php/en/1166821/vivianite-with-pyrite*](http://geogallery.si.edu/index.php/en/1166821/vivianite-with-pyrite)



Quartz and Silicon Chips

by Sue Marcus

Quartz, made up of silicon and oxygen, is commercially used to make glass—the clear see-through material akin to rock crystal. BUT … during processing, oxygen can be driven off chemically, leaving pure silicon. Silicon is like a metal, and it is used in silicon chips. Silicon is essential to the computer I'm using to type this—so thanks, quartz!

National Museum of Natural History
Smithsonian Arctic Spring Festival

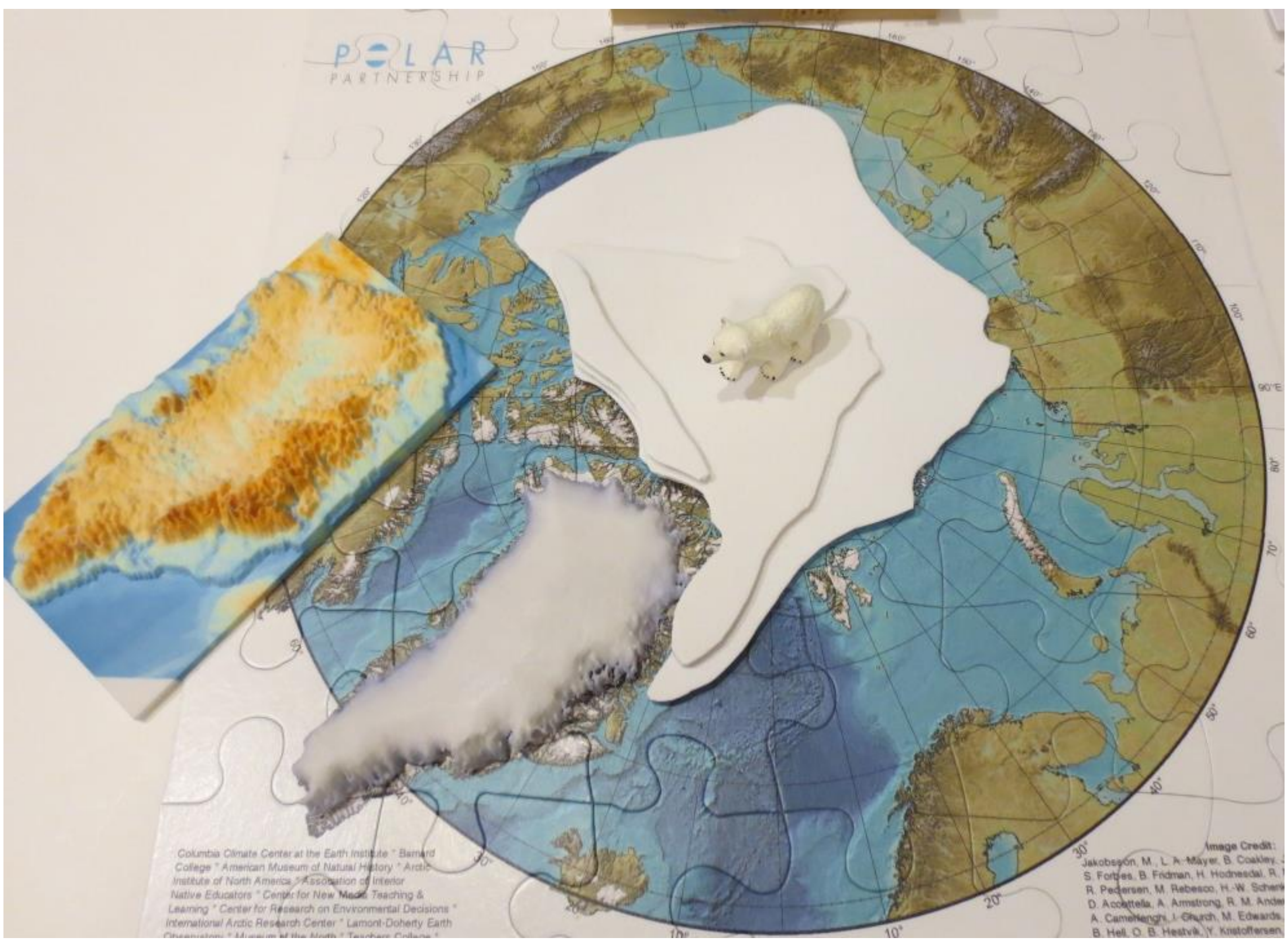
by Kathy Hrechka, Vice-President

Volunteers Sue Marcus, Kathy Hrechka, and Genny Haskins helped out at Arctic Spring Festival hosted by the Smithsonian Institution's National Museum of Natural History on May 8–10.

The three NVMC members assisted researcher Kirsteen Tinto at the Polar Partnership activity, sponsored by the National Science Foundation. Kirsteen is conducting polar climate change research at the Columbia Climate Center in New York.

The diagram below features a constructed puzzle of the Arctic Ocean covered by glacial ice, demonstrating ice cover in 1980 and 2012 and projected ice cover in 2050. Greenland is covered by a three-dimensional model of its ice cap, with its land mass topography to the side. ⛏

Left to right: Researcher Kirsteen Tinto and Smithsonian volunteers Sue Marcus, Kathy Hrechka, and Jenny Haskins.



Membership Building and Retention through Your Bulletin (Part 2)

by Mark Nelson, BEAC Chair

Editor's note: The article is abridged from A.F.M.S. Newsletter *(February 2015), p. 8.* The Mineral Newsletter *is* ***your newsletter****, and these are some great tips from an experienced editor! Does your newsletter reflect all of these suggestions? Are you willing to help out, perhaps by writing about our members' activities? Do you have other ideas for improvements? If so, please bring them to a club meeting or mention them to our president—or send them to me at* hutchbrown41@gmail.com.

Rock collecting clubs experience the same challenges as other social groups—attracting and retaining members. In this regard, we are actually in competition with groups such as the Lions, Kiwanis, and Rotary for adult members and with Scouting, 4H, youth soccer, and other extracurricular activities for youth.

One of the best tools a club has to attract new members and to increase the involvement of current members is its newsletter! This is a powerful resource that goes into members' homes to tell what your club has to offer. Your newsletter competes with scores of other mailers your members get—but you have an advantage! You are not selling anything! You are bringing news of a very interesting hobby and recreational activity that your members enjoy!

Capitalize on this advantage! Think like an outsider: Will your bulletin look more like a dry and dull mimeograph from the 1960s or like the cover of a newsstand magazine? Which will your members choose to look at? Make your newsletter professional and educational, and it will attract the attention of people seeking to enjoy our rockhounder hobby!

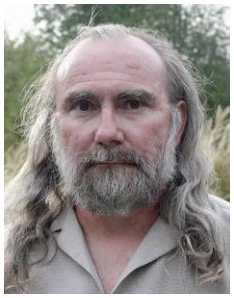
Here are this month's suggestions for a more interesting bulletin:

- When we read *Rock & Gem* magazine, we see an eye-popping photo of rhodochrosite and want to open the magazine to see where we can go to collect specimens like it! Take a tip and use photos on the front cover!
- Give photo credits and get permission to use photos from copyrighted sources. Mindat is a good source for photos; the individuals who own the rights to the photos are usually more than willing to give permission for noncommercial use if asked. Send them a copy of your newsletter as thanks!
- Use the front cover of your bulletin to let the reader know of interesting articles inside. Give page numbers.
- For your regular columns (like Prez Sez), put the photo of the author! Yes, you might know who your president is, but do your new members? Also, having a member's photo next to their article is a way of extending honor and appreciation—maybe they'll even do it again next month!
- Dedicate part of your bulletin to your club members. Dale Carnegie once said, "Remember that a man's name is to him the sweetest and most important sound in the English language." This is also true for photos of members! Whenever possible following a meeting, field trip, or other event, get photos of members into the next month's newsletter. By involving them on the pages of your newsletter, you will encourage involvement in other areas of your club.

Rhodochrosite from the Huallapon Mine, Pallasca, Pasto Bueno, Ancash Province, Peru. Smithsonian National Mineral Collection. Photo: Chip Clark. http://geogallery.si.edu/index.php/en/1084925/rhodochrosite

James L. Macie

by Andy B. Celmer, EFMLS Historian



Editor's note: The article is adapted from EFMLS News *(March 2015), p. 5.*

*H*ello, Seekers!

Lest you think me through with describing 18th-century mineral collections—au contraire, mon frère!

James Louis Macie was born in Paris in 1765 to Elizabeth Hungerford Keate Macie. He was the illegitimate son of Hugh Smithson Percy, Duke of Northumberland. (The good duke, born Smithson, had adopted his wife's prestigious surname of Percy.)

James studied chemistry and mineralogy at Pembroke College in Oxford, England. He collected extensively and developed his skills in analytical experimentation with minerals. In 1801, James adopted his father's surname, Smithson; in 1802, he published a paper identifying a "calamine" as zinc carbonate ($ZnCO_3$)—not zinc oxide, as the French mineralogist René Just Haüy (1743–1822) had surmised. Zinc carbonate was later named smithsonite in honor of Smithson.

James Smithson was quite wealthy when he died in 1829, leaving most of his estate to his nephew. His will contained the provision that if the nephew died childless the estate would go … to the United States of America, to found in Washington, DC, under the name Smithsonian Institution, "an establishment for the increase and diffusion of knowledge among men."

God, I love that kind of talk!

You guessed it: The nephew, Henry James Hungerford, died childless. Washington, DC, now has the greatest museum system in this country (author's opinion), known as the Smithsonian Institution.

The James Smithson estate amounted to $550,000 in the form of 105 bags of gold sovereigns, each containing 1,000 gold coins. In addition, it included 8,000 to 10,000 mineral specimens described and labeled in Smithson's own writing, along with his papers and other effects.

But not so fast! When it came to creating this great institution, President Andrew Jackson wasn't so sure he had the power to accept the gift. So he turned to Congress to give him said power. Senator John C. Calhoun of South Carolina thundered that it would abridge states' rights to accept the gift. Senator William Campbell Preston, also of South Carolina, sneered that "every whipper-snapper vagabond … might think it proper to have his name distinguished in the same way."

Accordingly, it took some time to pass the bill. ("How long does it take Congress to pass a bill?" "Three months." "What if it's an emergency?" "Four months!")

James Lacie, aka Smithson.

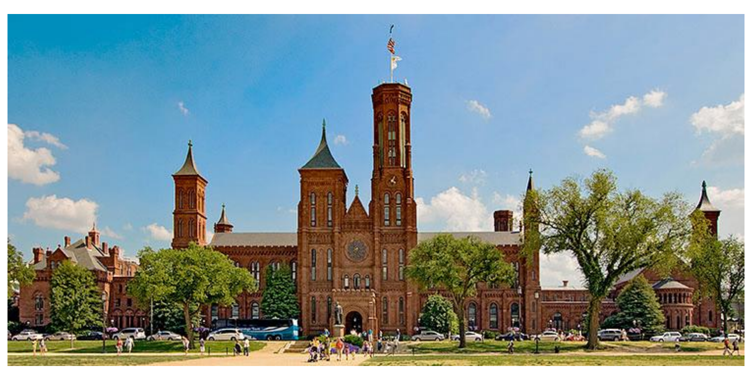
The Smithsonian Institution's exterior—i.e., what is now known as The Castle—was completed in 1849. The Smithson collection was soon installed, and we all lived happily ever after.

"But wait, Andy B!" both of my readers ask. "Why do we not see at least some of James Smithson's minerals on display?"

Funny you should ask.

January 24, 1865, was another cold day in the nation's capital. A few days prior, a stove was installed in the Smithsonian's picture gallery. Inadvertently, the exhaust from said stove was inserted into an air chamber in the wall instead of into the flue. A fire consumed the third floor, along with Smithson's mineral collection and most of his papers. Thus was the nation deprived of the legacy of James Smithson as a great mineral collector!

Smithsonian Regent Alexander Graham Bell brought James Smithson's remains to Washington, DC; they are interred in a tomb in The Castle. Next time you're in the nation's capital, stop by and visit! He loves the company! ⛏



The Rocks Beneath Our Feet

The Quartz in Our Creeks

by Hutch Brown, Editor

When I moved to northern Virginia in 1992, I started an aquarium of tropical fish. People decorate their aquariums with more than just fish, typically with a showy centerpiece of rock or wood.

I found my showpiece in Long Branch creek, near the nature center where our club meets. It was a large angular piece of quartz, orange in color, and it wasn't hard to find. None of the bedrock nearby was quartz, yet there was plenty of quartz in the stream bed.

Why is there so much quartz in our creeks when most of the bedrock is clearly something else?

Abundance

Quartz (SiO_2) is made up of silicon and oxygen, the two most common elements in the Earth's crust. Together, silicon and oxygen account for almost three-quarters of the weight of the Earth's crust.

The three feldspar groups (alkali, plagioclase, and barium) contain most of the silicon and oxygen in the Earth's crust. These silicate minerals alone account for about 60 percent of the Earth's crust.

But quartz is second to the feldspars in abundance, comprising about 12 percent of the Earth's crust. So you would expect to find a lot of it around.

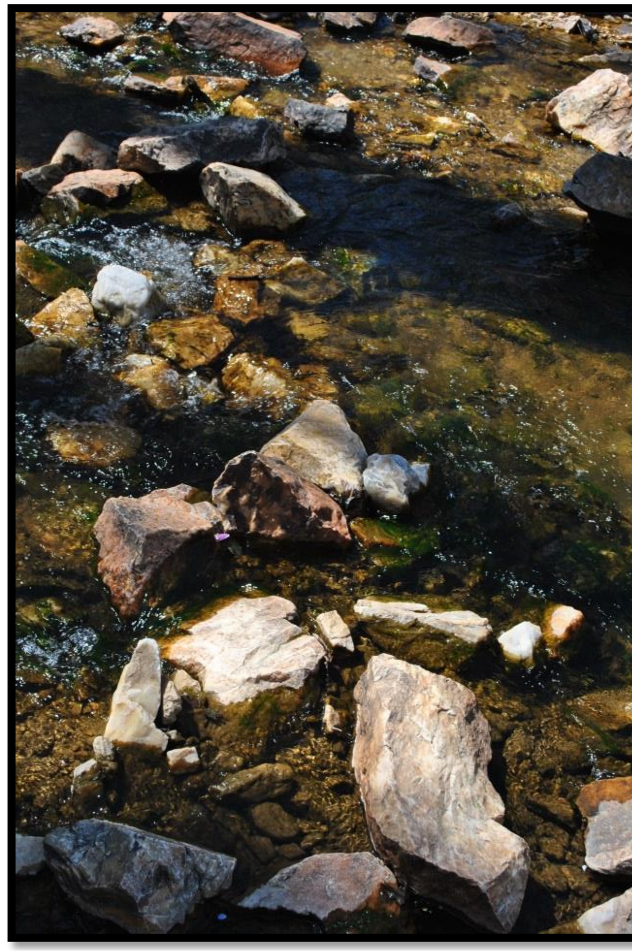
And you do, although not always in easily recognizable form. Granite contains most of the Earth's quartz; metamorphic and sedimentary rocks contain smaller amounts. Sandstone and quartzite, both mainly granular quartz, contain the highest quartz concentrations.

Yet the quartz in our creeks is mostly solid rather than granular. So where do all the massive quartz rocks in our creeks come from?

Quartz Lenses

The most obvious sources of quartz in our creek beds are the enormous quartz lenses embedded in the metamorphic bedrock in our area. Some of the quartz lenses are gigantic—tens of feet thick.

One such lens overlooks a tributary of Accotink Creek in Fairfax County called Long Branch. The quartz outcrop is huge—as kids, we dubbed it Rock Fort—and it provides almost all of the alluvium in the nearby stream bed, as shown above.



Long Branch creek, a tributary of Accotink Creek in Fairfax County, VA. Most of the alluvium in the stream bed is clearly quartz. Photo: Hutch Brown.

In fact, a geologic map for the Fairfax quadrangle suggests that the quartz outcrop underlies Long Branch creek (fig. 1). As far as I could tell when I visited the site in early 2014, quartz does form a visible part of the bedrock for the creek.

But huge quartz lenses make up only a tiny proportion of the bedrock compared to the surrounding metamorphic rock, such as Lake Barcroft metasandstone (fig. 1). Moreover, quartz lenses are not all that common. Arlington County has only one; known as Brandymore Castle, it overlooks Four Mile Run near Falls Church, VA. Yet you can find plenty of quartz in Four Mile Run all along its course, both upstream and downstream from Brandymore Castle.

So there must be other sources of quartz.

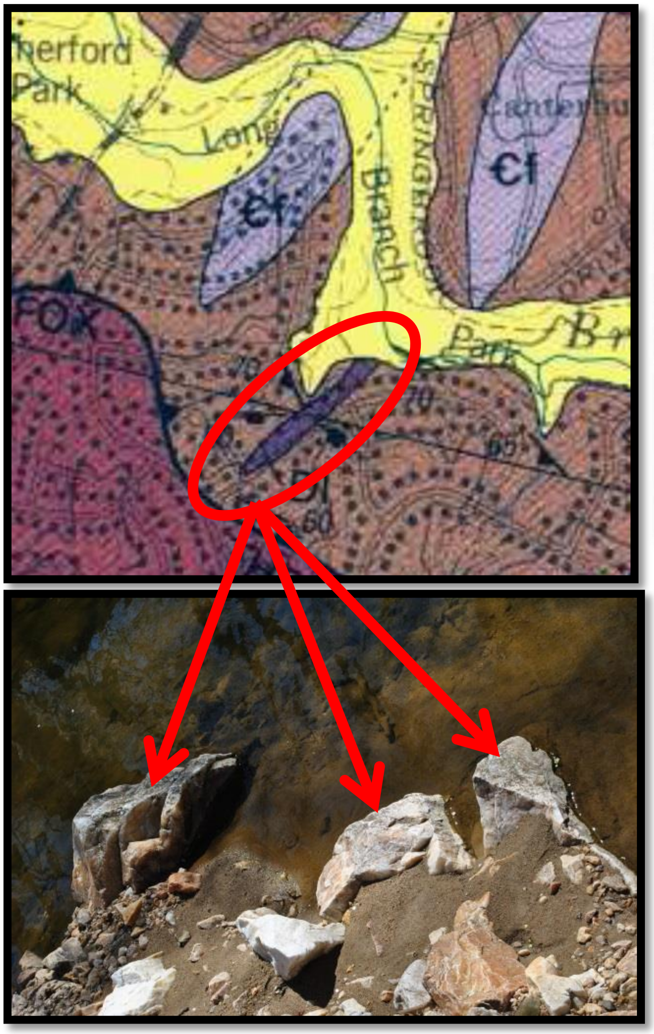


Figure 1—*The circled quartz lens (top) near Long Branch in Fairfax County appears to underlie the creek, forming part of its bedrock (bottom). Yellow = alluvium in the creek; brown = Lake Barcroft metasandstone; burgundy = Indian Run sedimentary melange (the bedrock in much of Arlington); lilac = Falls Church tonalite (an intrusive igneous rock similar to granite). Map: Drake (1986); photo: Hutch Brown.*

Quartz vein upstream from the Long Branch Nature Center where our club meets. The bedrock is Indian Run sedimentary melange, tinged green by moss as it flakes and weathers. Photo: Hutch Brown.

Segregation Quartz

Another source of quartz in our creeks is quartz veins and nodules. You can easily find both in the metamorphic bedrock near Long Branch Nature Center, where our club meets in Arlington.

The veins are smaller, more common versions of the massive quartz lenses in our area. Like the lenses, the veins formed from quartz that ancient parent rocks like sandstone and siltstone already contained. In Arlington, for example, most of the bedrock is Indian Run sedimentary melange, a metamorphic rock made up of quartz-rich sands and silts laid down in an ancient ocean trench about half a billion years ago.

During mountain-building events, the immense pressure of the tectonic forces heated, buckled, and folded the sedimentary parent rock. Aided by hydrothermal processes, tectonic forces squeezed out quartz from the rock, depositing it in cracks and fissures. As the rock cooled, veins and lenses of pure white quartz formed, sometimes tinged with orange, pink, and red.

The process is called lateral secretion, and the result is known as segregation quartz. Lateral secretion is part of the broader process of metamorphism that yields such rocks as schist, gneiss, quartzite, and the Indian Run sedimentary melange near the Long Branch Nature Center. All of these rocks contain veins, bands, or inclusions of pure quartz.

In addition to veins, the Indian Run sedimentary melange contains small quartz nodules—rounded pieces of quartz (fig. 2). How did they get there?

Geologists believe that the Indian Run sediments came from debris slides into an ancient ocean trench, probably caused by earthquakes. Following the turbidity caused by a submarine slide, the heavier materials settle out of the water before the lighter ones do. Graded layers of sediment form, from heaviest at the bottom to lightest at the top.

Yet the quartz nodules embedded in the Indian Run bedrock seem to be random and unsorted. They do

Figure 2—*Quartz nodules in Indian Run sedimentary melange along a tributary of Four Mile Run called Long Branch. Segregation quartz? Drop rocks? Photo: Hutch Brown.*

Potomac Formation exposure in an embankment overlooking Lubber Run in Arlington. The unsorted sediments range from clay to cobble, including rounded pieces of white quartz (circled). Photo: Hutch Brown.

not seem to have been part of the ancient submarine debris slides. Instead, the quartz nodules might have formed through lateral secretion—in exactly the same way as the quartz veins formed.

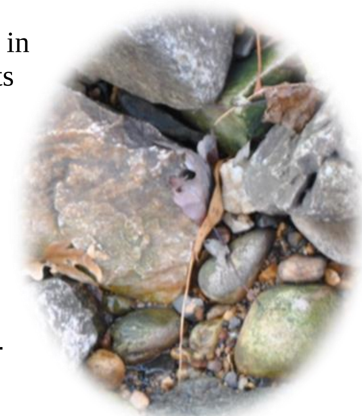
Another possibility is that the quartz nodules are what geologists call drop rocks: extraneous pieces of rock that fell into the soft Indian Run sediments after they had already been laid down. The rocks might have been shaken loose by postquake tremors, for example, and carried by powerful submarine currents, drifting down onto the sediments.

Unconsolidated Sediments

Beginning at the Fall Line, the Cambrian bedrock in Arlington is mostly overlain by much younger sediments. An ancient river system, forerunner of the Potomac, began depositing the sediments about 140 million years ago. A layer of Cretaceous sediments known as the Potomac Formation directly overlies the Cambrian bedrock. On top of the Potomac Formation are sediments from the Tertiary Period.

Though densely packed, the Potomac sediments do not form rock. They are often unsorted, ranging from clay, to silt, to sand, to cobble. The rocks are rounded, betraying their riverine origins.

The creeks in Arlington have worn through the Potomac Formation down to the metamorphic bedrock, exposing deeply incised stream banks with sediments of various sizes. Erosion has washed the finer sediments in the stream beds away, leaving an abundance of rounded cobble. The cobbles include many pieces of rounded quartz.



The size and shape of the quartz in our stream beds determine its origin. Large chunks and angular pieces of quartz most likely came from veins and lenses in the bedrock. The rounded pieces of quartz, with origins from across the interior of Virginia, probably came from the Potomac Formation of unconsolidated sediments.

However, some might have come from the bedrock itself. In figure 2, the quartz nodules are visibly standing out from the metamorphic matrix, which is eroding away around them. The nodules embedded in the Indian Run sedimentary melange will eventually fall into the creeks.

Why aren't the quartz nodules eroding away at the same rate as the Indian Run matrix?

Durability of Quartz

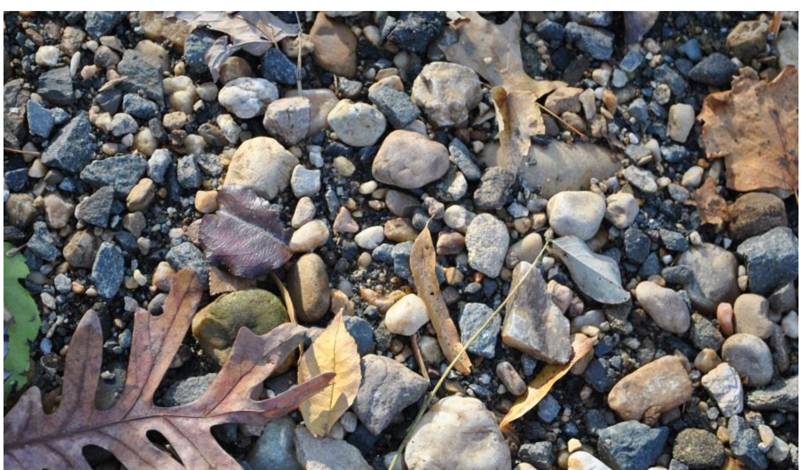
Quartz is a stable mineral. It does not readily react with air or water to form other minerals. By contrast, the metamorphic bedrock in our area is highly prone to weathering. You can easily find crumbling pieces of the dark Indian Run sedimentary melange along the Arlington creeks; they are well on their way to becoming oxidized (rusty) red clay soil.

You will see no such weathering in the surrounding quartz. In our creek beds, quartz gradually breaks apart and wears away, but the process is slow because quartz is so hard, with a hardness of 7 on the Mohs Hardness Scale. Other kinds of rock and minerals in our area break apart and wear away much faster, in good part because they are so prone to weathering. Accordingly, quartz makes up a highly disproportionate amount of the rocks and cobble in our creeks.

The Quartz Cycle

None of this is particularly surprising. Most people, if they know anything at all about rocks, can recognize quartz. Many know that quartz forms veins and outcrops and that there is a lot of it in our creeks.

To me, however, it's astounding that a mineral so scantily represented in our area's bedrock in its purest form—as solid quartz—is so well represented in our area's creeks.



A gravel bar along Lubber Run in Arlington. The lighter rocks are mostly quartz; the darker ones are mostly metamorphic matrix rock that is rapidly weathering away. Photo: Hutch Brown.

Quartz vein in the Indian Run sedimentary melange at Huffman's Falls on Four Mile Run in Arlington. Photo: Hutch Brown.

The quartz in our creeks is actually at an intermediate stage in the quartz cycle. As it is carried downstream, it is gradually ground down into sands. Deposited by rivers and carried by ocean currents, it makes up most of the sand on our beaches. In a similar process, the dark-colored mountains in the arid West are gradually wearing away, leaving light-colored plains of mainly quartz and feldspar sands.

And then the cycle begins anew, with the formation of sandstone, siltstone, and other sedimentary rocks. Transformed by mountain-building events, they become metamorphic rocks full of bands, veins, lenses, and nodules of pure light-colored quartz—fresh material for creeks far into the future.

Sources

Akhavan, A.C. 2013. The Quartz page: Origin of quartz. http://www.quartzpage.de/gen_ori.html.

Drake, A.A., Jr. 1986. Geologic map of the Fairfax quadrangle, Fairfax, VA. USGS GQ–1600. Reston, VA: U.S. Geological Survey. http://ngmdb.usgs.gov/Prodesc/proddesc_1126.htm.

Fichter, L.S.; Baedke, J.K. 1999. The geological evolution of Virginia and the mid-Atlantic region. Harrisonburg, VA: College of Science and Mathematics, James Madison University. http://csmres.jmu.edu/geollab/vageol/vahist/index.html.

Color in Quartz

by John Vanko

Editor's note: The piece is adapted from The Conglomerate *(newsletter of the Baltimore Mineral Society), March 2009, pp. 1–3.*

Quartz cluster with rock crystal and milky quartz. Source: Wikipedia.

Quartz is often the first mineral we collect. Quartz is found just about everywhere. It's interesting, collectable, and generally inexpensive.

Quartz is also quite varied. Entire technical works have been devoted to it (see especially *Dana's System of Mineralogy*, volume III: *Silica Minerals* (1962), by Clifford Frondel). For the purposes of this article, by quartz I mean the crystalline variety of silica (SiO_2) as opposed to the fine-grained and cryptocrystalline varieties (like chalcedony, agate, chert, flint, sard, carnelian, chrysoprase, heliotrope, and bloodstone) and the higher temperature forms of silica (like tridymite, cristobalite, and keatite).

Quartz in its purest form is colorless. We call colorless quartz **rock crystal**. Rock crystal passes all light through itself. An undamaged, colorless rock crystal with perfect faces should be in everyone's mineral collection.

More common is **milky quartz**. This white to gray variety is due to microscopic bubbles, voids, or inclusions dispersed throughout. More or less opaque white, it is the least interesting color variety of quartz. Uniformly milky specimens are perhaps less commonly seen at mineral shows. Ouray, CO, is one locality famous for its high-quality milky quartz crystals.

Smoky quartz is much more interesting. It can vary in color from light gray to dark gray and from light brown or yellowish brown to dark brown or nearly opaque black. Some of the blackest varieties can be due to dense inclusions of other minerals.

The transparent variety of smoky quartz is due to small quantities of aluminum substituting for silicon in the SiO_2 structure of the crystal. This causes an anion vacancy or an unpaired electron on an oxygen ion. The result is that light passes through the crystal in a way that induces the smoky color.

Curiously, smoky quartz turns colorless if sufficiently heated for a long enough time. But the smoky color returns if the specimen is sufficiently exposed to x-rays or gamma rays. Quartz from Arkansas that has been exposed to x-rays is widely available at mineral shows. Extremely dark (often opaque), it makes a good addition to your collection alongside colorless Arkansas quartz.

Quartz crystals found in the Alps of Europe are more likely to be smoky at higher altitudes and colorless at lower altitudes or deep within mines. The reason is the greater abundance of natural gamma rays at higher altitudes.

Smoky quartz. Source: Wikipedia.

Amethyst is related to smoky quartz and can intergrade with it. But amethyst is also quite distinct. Its color—which can vary from violet, to bluish violet, to reddish violet, to purplish violet—is due to a compound of ferric iron dispersed within the crystal at a submicroscopic level. More than one compound can be involved, giving rise to slightly different colors.

Amethyst almost always has what is called polysynthetic twinning—minute, alternately handed twinning of the quartz SiO_2 structure. This combination of right-handed and left-handed structures is called Brazil

Amethyst cluster. Source: Wikipedia.

Law Twinning. Amethyst with twinning never seems to exhibit the s or x faces that define quartz's crystal class and are so prevalent in colorless and smoky quartz. Heating amethyst can turn it into citrine, the yellow variety of quartz; irradiating the citrine with x-rays transforms it back into amethyst.

Ametrine, Smithsonian National Mineral Collection. Photo: Chip Clark. http://geogallery.si.edu/

Of particular interest are crystals of ***ametrine***, which exhibit both the amethyst color and the citrine color in the same crystal, with reasonably sharp boundaries between the two colors. How this is possible I don't understand, but it must require just the right conditions, because we find ametrine only in the Santa Cruz Department of Bolivia.

Synthetic amethyst doesn't have polysynthetic twinning—not because polysynthetic twinning can't be produced in the laboratory but because it makes no apparent difference to the color. The least expensive way to make synthetic amethyst is without polysynthetic twinning.

Citrine can be pale yellow to almost brown and is less commonly saffron, honey, or golden yellow in color. The color of natural citrine is apparently due to colloidally dispersed particles of hydrous ferric oxide (their transmission spectra are identical).

Citrine does not become amethyst with irradiation but can become more smoky. Citrine is quite rare compared to amethyst and smoky quartz. Famous localities include Madagascar, Uruguay, Minas Gerais in Brazil, and the Ural Mountains of Russia.

Citrine, Smithsonian National Mineral Collection. Photo: Chip Clark. http://geogallery.si.edu/

Some amethyst exhibits a very rare color change upon heating: it turns gray-green or grass green, apparently in place of the citrine color. Such amethyst comes from just a few localities around the world, with the most famous being the Montezuma locality in Minas Gerais, Brazil.

Other **green quartzes** are usually the result of inclusions like chlorite. Massive quartz with inclusions of fuchsite (a chromium variety of muscovite) displays a green color; it is known as aventurine. Aventurine does not form euhedral crystals (crystals with distinct faces). Thin coatings of green minerals on the surface of otherwise clear crystals can impart a green color, but this is not true green quartz.

Rose quartz is very common. It is usually found at the center of otherwise gemmy pegmatites—the pegmatites of New England are classic examples, especially the ones from Newry, ME. The crystalline specimens I have purchased and others I have seen are always turbid and opaque.

Rose quartz varies in color from very pale shades of pink, to rose, to deep rosy pink. Some is faintly purplish or lavender in cast. Most is more or less turbid and cracked—but not all.

Rose quartz skirt on smoky quartz, Smithsonian National Mineral Collection. Photo: Chip Clark. http://geogallery.si.edu/

In recent years, Brazilian rose quartz crystals have surpassed the New England material in quality, with truly transparent rose quartz crystals available. Whether these crystals have the same color mechanism as massive rose quartz from New England is an open question. There can be more than one way to obtain rose quartz. Nevertheless, the beautiful rose color of crystals from Brazil looks much like the massive rose quartz from New England. Rose quartz is more responsive to x-ray irradiation than other quartzes, becoming quite black and virtually opaque.

The origin of the color in rose quartz is not settled. Early investigators found higher levels of titanium and manganese than in other quartzes, but these metals probably do not color common rose quartz. Needles of rutile that make for asterism in rose quartz might account for the higher levels of titanium. Manganese causes the pink color of rhodochrosite, and the depth of the rose color in quartz apparently correlates with the quantity of manganese.

Nevertheless, manganese might not be key. Lithium and iron, also relatively abundant in rose quartz, are known to induce pink in other minerals. Dumortierite, an aluminum iron borosilicate, has been recently suggested as the possible coloring agent in rose quartz. Some other recent analyses point to phosphate ions as the possible source of color in rose quartz. When all is said and done, we might discover that there is more than one cause for the color of rose quartz.

Blue quartz is relatively rare. It is usually found as grains in igneous and metamorphic rocks. Some of the grains are euhedral crystals.

The blue color derives from the scattering of light by relatively large but still microscopic needles of rutile within the grains. This is called Tyndall scattering or the Tyndall effect. The color ranges from faint soft blue or milky blue to smoky blue, plum blue, or lavender blue. The color resembles some bluish chalcedony.

Blue quartz is notable from the charnockite series in India, as phenocrysts in red porphyry near Llano, TX, and from the titanium-bearing rocks of Amherst and Nelson Counties, VA.

Red quartz crystals are known from Valencia, Spain. These opaque crystals appear to be red chalcedony pseudomorphs after quartz. Their color exactly resembles red jasper or red chalcedony, both colored by iron oxide. Whether they are true pseudomorphs or not I do not know, but they certainly look like it.

So quartz, one of our most common minerals, can be found in a wide variety of colors. It is readily available, easy to collect, and easy to purchase, usually at a reasonable cost.

Isn't it time for you to get started?

Heavy-Mineral Sands

by William Beiriger

Editor's note: The piece is adapted from Livermore Lithogram (newsletter of the Livermore Valley Lithophiles, Livermore, CA), November 2009, p. 4.

Seventy percent of the world's sands contain mostly quartz, with little or nothing else. But in some areas, 10 percent or more of the sand is made up of heavy minerals. Heavy minerals mixed in with quartz sands can be found on many beaches, rivers, and dunes around the world.

After storms, the wave action on a beach can remove the lighter grains of sand and pull them back out to sea, leaving the heaver grains behind. The same thing goes for rocks. That is why you go to the beach in the winter to collect agates.

In the case of sand dunes, the prevailing winds blow the less dense quartz sands over the top of a dune, leaving the heavier material behind. It's the same principle as panning for gold: As you swirl the water in your pan, the dense gold is left behind as the less dense material washes over the edge.

Take a trip to the beach and look for areas that show color changes around rocks on the beach. On many California beaches, you can find high concentrations of pink or rose garnet and black iron minerals separated from the quartz sand. Use a magnet and see if you can pick up the black sand; if you can, it is magnetite.

In many parts of the world, there are industries that mine heavy sands for minerals like rutile, ilmenite, zircon, monazite, and garnet. Other heavy minerals like amphiboles, pyroxenes, olivine, tourmaline, corundum, and topaz can also be found on many beaches. Beaches along the coast of Namibia are heavy with diamond-containing sands that can be profitable to mine. The main problem with sand mining is that it can damage the environment.

Australia, South Africa, Canada, and China do the most heavy-mineral sand mining. About ten other countries (including the United States) are not far behind.

Heavy minerals on California beaches.

Left: Black magnetite is mixed in with white quartz in the sand.

Bottom: The rose color in the sands comes from garnet mixed in with the quartz.

GeoWord of the Day

(from the American Geoscience Institute)

talus

Rock fragments of any size or shape (usually coarse and angular) derived from and lying at the base of a cliff or very steep, rocky slope. Also, the outward sloping and accumulated heap or mass of such loose broken rock, considered as a unit, and formed chiefly by gravitational falling, rolling, or sliding. Cf: *alluvial talus; avalanche talus; rockfall talus.* See also: *scree.* Syn: *rubble.* Etymol: French "talu," later "talus," "a slope," originally in the military sense of fortification for the outside of a rampart or sloping wall whose thickness diminishes with height; from Latin "talutium," a gossan zone or slope indicative of gold (probably of Iberian origin). Pl: taluses.

(from the *Glossary of Geology*, 5th edition, revised)

Upcoming Events
(of interest in the mid-Atlantic region)

May

15–17: InterGem Show; Dulles Convention Center; Chantilly, VA.

16–17: 47th Annual World of Gems & Minerals Show; Berks Mineralogical Society; Leesport Farmers Market Banquet Hall, 312 Gernant's Church Rd, Leesport, PA.

16–17: Cape-Atlantic Rock Hounds Annual Spring Gem, Jewelry, Rock, Mineral and Fossil Show; 2641 Cologne Ave, Mays Landing, NJ; Sat/Sun 9–5; free parking/admission; info Billie Brockhum (show chair & VP) 609-879-1179, www.capeatlanticrockhoundsclub

16–17: Annual Spring Outdoor Rock Swap & Sale; North Jersey Mineralogical Society's; Sterling Hill Mining Museum, 30 Plant St, Ogdensburg, NJ; Sat/Sun 9–5; free admission; info: http://www.nojms.webs.com

18–24: Wildacres; Little Switzerland, NC; $390 plus materials fee; registration starts Jan 1; information at http://efmls-wildacres.org/

30: 26th Annual Chesapeake Gem & Mineral Show; Chesapeake Gem & Mineral Society; Ruhl Armory, I-695 exit 26 south, Towson, MD; Sat 10–4; free admission & parking; info: http://www.chesapeakegemandmineral.org/club-show.html

June

6: 64th Semi-Annual Spring Mineralfest Show; Pennsylvania Earth Sciences Association; Macungie Memorial Park, Macungie, PA.

6–7: GemFest 2015; Wayne County Gem and Mineral Club; Greater Canandaigua Civic Center, 250 N. Bloomfield Road, Canandaigua, NY; info: www.wcgmc.org

6–7: Mineral, Gem, Jewelry, Fossil SHOW SELL & SWAP; Orange County Mineral Society; Museum Village, 1010 Rt. 17M, Monroe, NY; Sat/Sun 10–4; adults $5, seniors & kids $;

July

11–12: GemWorld 2015, 49th Annual Show; Gem & Mineral Society of Syracuse; SRC Arena and Events Center, Syracuse, NY; contact Dick Lyons show@gmss.us

11–12: 54th nnual show; Oxford County Mineral & Gem Association; Telstar High School, RTE #26; Sat 10–5, Sun 10–4; adults $3, kids under 12 free; guided field trips to a local mine each day—must sign up at the show, leave by 11; info: Dennis Gross, mincoll@megalink.net

25–26: 34th Annual Gem, Mineral & Jewelry Show; Long Island Mineral & Geology Society; Main Road (Rte 25), Cutchogue, NY; Sat 10–5, Sun 10–5; adults $6 (with flyer $5), children under 12 free; info: http://www.limineralandgeology.com

August

22–23: 50th Annual Rock & Mineral Show; St. Lawrence Co. Rock & Mineral Club; Madrid Community Center, Madrid, NY.

September

19–20: Cape-Atlantic Rock Hounds Annual Fall Gem, Jewelry, Rock, Mineral and Fossil Show; 2641 Cologne Ave., Mays Landing, NJ; Sat/Sun 9–5; info: capeatlanticrockhoundsclub or call Billie Brockhum at 609-879-1179

26–27: 51st Annual Gem, Mineral & Jewelry Show; Gem Cutters Guild of Baltimore; Howard Co. Fairgrounds, West Friendship, MD.

26–27: 59th Annual Franklin-Sterling Gem & Mineral Show; Franklin Mineral Museum; Franklin School, 50 Washington Ave, Franklin, NJ; Sat 9–5, Sun 10–4; Outdoor Swap: Sat 7:30–6, Sun 10–5; adults $7, children 6–16 $4; http://spmom3.wix.com/franklin-gem-mineral

October

23–25: AFMS Convention and Show, hosted by the Southwestern Federation; Austin, TX.

2015 Club Officers

President: Wayne Sukow
d8olite@fastmail.fm
Vice-President: Kathy Hrechka
kshrechka@msn.com
Secretary: Dave MacLean
dbmaclean@maclean-fogg.com
Treasurer: Rick Reiber
mathfun34@yahoo.com
Field Trip Chair: Ted Carver
jtcarve@msn.com
Webmaster: Casper Voogt
webmaster@novamineralclub.org
Communications: Jim Kostka
jkostka@juno.com
Editor: Hutch Brown
hutchbrown41@gmail.com
Show Co-Chair: Tom Taaffe
rockcllctr@aol.com
Show Co-Chair: Jim Kostka
jkostka@juno.com
Greeter/Door Prizes: Ti Meredith
ti.meredith@aol.com

PLEASE VISIT OUR WEBSITE AT:
http://www.novamineralclub

The Northern Virginia Mineral Club

You can send your newsletter articles to:

news.nvmc@gmail.com

Visitors are always welcome at our club meetings!

RENEW YOUR MEMBERSHIP!

SEND YOUR DUES TO:
Kenny Loveless, Treasurer, NVMC
PO Box 10085, Manassas, VA 20108

OR

Bring your dues to the next meeting.

Purpose: To promote and encourage interest in and learning about geology, mineralogy, lapidary arts, and related sciences. The club is a member of the Eastern Federation of Mineralogical and Lapidary Societies (EFMLS, http://www.amfed.org/efmls) and the American Federation of Mineralogical Societies (AFMS—at http://www. amfed. org).

Dues: Due by January 1 of each year; $15 individual, $20 family, $6 junior (under 16, sponsored by an adult member).

Meetings: At 7:45 p.m. on the fourth Monday of each month (except May, November, and December)* at **Long Branch Nature Center**, 625 Carlin Springs Road, Arlington, VA 22204. (No meeting in July or August.)

**Changes are announced in the newsletter; we follow the snow schedule of Arlington County schools.*